2.1.1. Roots of a Quadratic Equation

10:25

Write a program to find the roots of a quadratic equation, given its coefficients a, b, and c. Use the quadratic formula: $\frac{\left(-b \pm \sqrt{b^2 - 4ac}\right)}{2a}$

The discriminant $D = b^2 - 4ac$ determines the nature of the roots:

- If $D > 0$: Roots are real and different
- If $D = 0$: Roots are real and the same
- If $D < 0$: Roots are imaginary

Input Format:

- Three space-separated integers representing the coefficients a, b, and c, respectively.

Output Format:

- If roots are real and different, print:

```
root1 = <Root1>
root2 = <Root2>
```

- If roots are the same, print:

```
root1 = root2 = <Root1>
```

Sample Test Cases +

Explorer

quadratic...

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Debugger

```python
import math
a, b, c = map(int, input().split())
D = b**2 - 4*a*c

if D > 0:
    root1 = (-b + math.sqrt(D)) / (2*a)
    root2 = (-b - math.sqrt(D)) / (2*a)
    print(f"root1 = {root1:.2f}")
    print(f"root2 = {root2:.2f}")
elif D == 0:
    root = -b / (2*a)
    print(f"root1 = root2 = {root:.2f}")
else:
    real_part = -b / (2*a)
    imag_part = math.sqrt(-D) / (2*a)
    print(f"root1 = {real_part:.2f}+{imag_part:.2f}i")
    print(f"root2 = {real_part:.2f}-{imag_part:.2f}i")

```

Terminal Test cases

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Algorithm To Find Roots of a Quadratic Equation

Given a quadratic equation:

$$ax^2 + bx + c = 0$$

Step 1: Start

Step 2: Declare variables a, b, c, d, x1, x2

Step 3: Read the values of a, b, and c

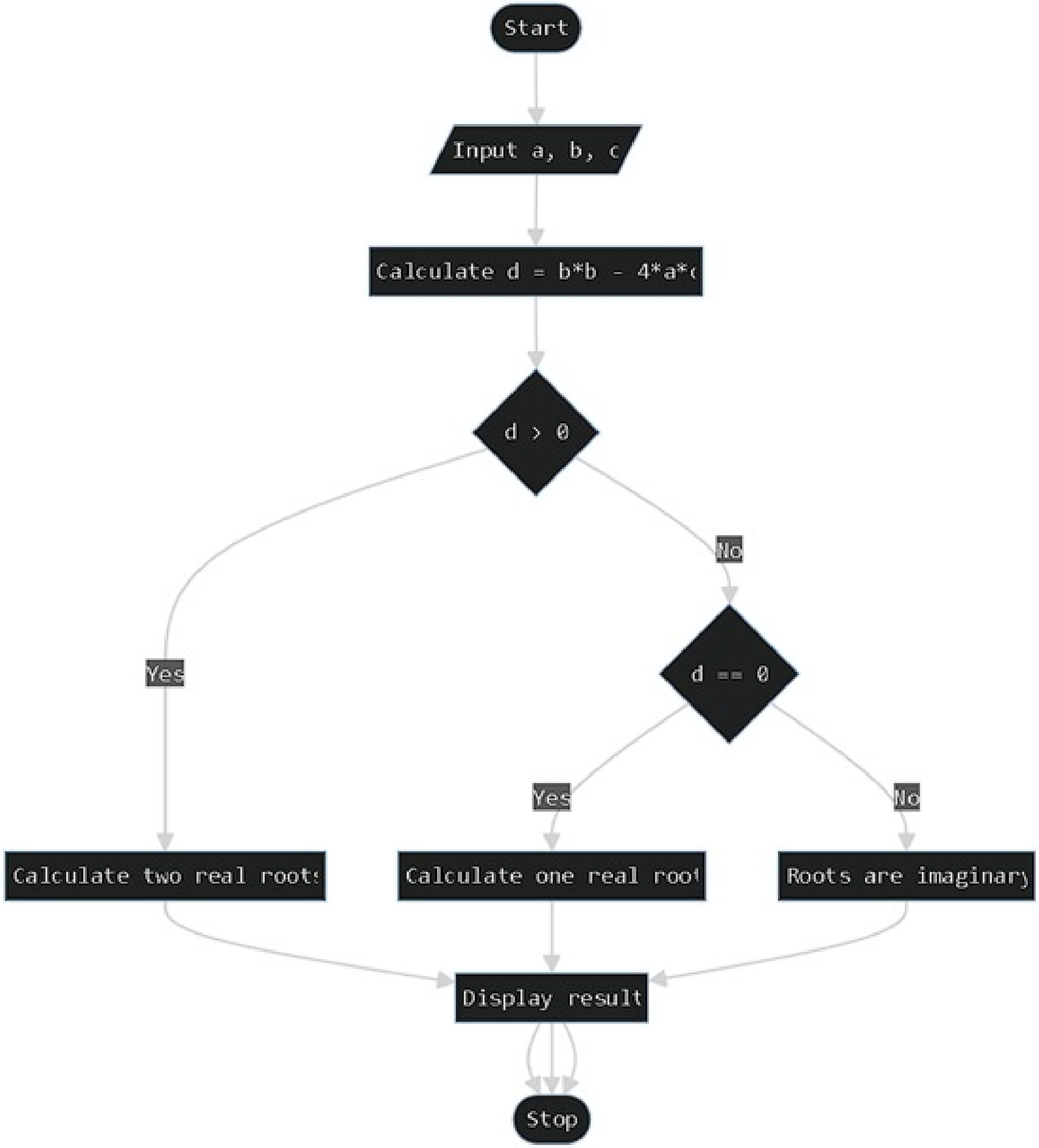
Step 4: Calculate the discriminant

$$d = b * b - 4 * a * c$$

Step 5:

- If d > 0, calculate
  - x1 = (-b + sqrt(d)) / (2 * a)
  - x2 = (-b - sqrt(d)) / (2 * a)
  - Display Real and different roots
- Else if d == 0, calculate
  - x = -b / (2 * a)
  - Display Real and same roots
- Else
  - Display Imaginary roots

Step 6: Stop


Start
Input a, b, c
Calculate d = b*b - 4*a*
d > 0
Yes
No
d == 0
Yes
No
Calculate two real root
Calculate one real roo
Roots are imaginar
Display result
Stop